One Water NYC: 2021 Demand Management Annual Update

NYC Environmental Protection

Bill de Blasio
Mayor
Vincent Sapienza, P.E.
Commissioner

Please print this plan using the double-sided printer setting.

Cover photograph: Central Park Lake

Photo Credit: NYC Department of Parks & Recreation

Table of Contents

Introduction

The COVID-19 pandemic presented many challenges for New York City and the world in 2020. Despite an unprecedented year, DEP's Water Demand Management Program continued to make progress towards achieving the 20 million gallons per day (MGD) of water savings goal established in the 2018 Water Demand Management Plan. For example, DEP completed municipal building retrofits in partnership with the NYC Department of Citywide Administrative Services, and water-saving equipment upgrades in DEP's wastewater resource recovery facilities (WRRFs). DEP also completed the Water Challenge to Universities, a voluntary program that engaged six universities in identifying and implementing water savings strategies, with achieved water savings of 0.12 MGD, which exceeded the Challenge's goal.

DEP also made considerable progress on a water recirculation project in Central Park, a valve replacement project in Prospect Park, fixture retrofits in New York City public school facilities, and fixture retrofits in a City College of New York facility. DEP continued to offer the Water Conservation and Reuse Grant Pilot Program, and selected grant recipients for its first round of grant funding. While the primary goal of these programs is to conserve potable water, many also offer co-benefits and are an important part of DEP's One Water approach towards managing water resources. For example, water conservation and water reuse projects reduce flows to the sewer system and wastewater facilities, which can contribute to reductions in combined sewer overflows.

As part of the Wholesale Customers Water Demand Management Program, DEP and its Utility Partners have agreed to pause current plans to implement projects until funding becomes available. Utility Partners were encouraged to continue utilizing tools that were introduced and discussed during prior collaboration, including continuing to improve their efforts to address non-revenue water. Despite the pause, DEP's robust outreach and engagement coupled with the determination and initiative of the Utility Partners, has resulted in considerable demand savings; in total, the two-year sustained water demand savings achieved by the seven participating Utility Partners is 5.21 MGD, a 9 percent decrease from their 2013 baseline. DEP would like to thank and recognize its participating Utility Partners for implementing conservation projects and water loss control strategies to achieve these savings.

Demand Management Program: Progress to Date

Strategy	Savings Achieved to Date (MGD)	Total Savings Anticipated (MGD)
Municipal Water Efficiency Program	8.03	11.55
Residential Water Efficiency Program	1.03	1.03
Non-residential Water Efficiency Program	0.21	0.41
Water Distribution System Optimization	1.89	1.89
Water Supply Shortage Management*	0	0
Wholesale Customers Demand Program	5.31	5.31
TOTAL	**16.47**	**20.19**

* 5 MGD contingency savings from Revised Water Shortage Rules not included in total savings anticpated estimate.

Since 2009, average daily demand has been below the 1960s drought-of-record (1,045 MGD). Demand in 2020 was at a 60+ year low, due in part to the COVID-19 pandemic and statewide closure. Demand decreased about 5% (nearly 50 MGD) from mid-March through April 30, following emergency declarations. Demand began to rebound in June, consistent with the phased reopening of NYC (Figure 1). Continued savings will help provide a critical buffer prior to and during the repair of the Delaware Aqueduct, planned for 2022. Furthermore, lower demand will help optimize reservoir water levels during times of drought, and reduce the energy and greenhouse gas emissions associated with conveyance and treatment of water and wastewater. As of May 2021, DEP's water efficiency programs have led to a reduction of 48 metric tons (MT) CO2 equivalent (CO2e) per year from reductions of potable water demand and 138 MT CO2e per year from reductions of volume to WRRFs. Overall, DEP's water efficiency programs have reduced carbon emissions by over 186 MT CO2e per year and energy use by 693,748 kWh/ year. This is equivalent to 49 standard passenger cars (10,000 miles per year) or 3,962 60-Watt lightbulbs (used for 8 hours per day, every day), and a total energy cost savings of approximately $74,658 per year.

This annual report describes DEP's program highlights from the past year and plans for the coming year, and measures progress toward our 20 MGD by 2022 savings goal. This report, an interactive online map (see Appendix C) that shows the location of DEP's projects, the estimated demand savings, and the estimated energy and greenhouse gas reductions from each project, is available at nyc.gov/dep/conservation. DEP is working diligently to advance initiatives under each of our six strategies for water demand reduction, and will continue to leverage our partnerships, promote leak detection, and optimize our own infrastructure. These strategies will help ensure the reliability of the City's water resources, both in the near term during the Delaware Aqueduct shutdown and beyond, as we continue to pave our way towards a low-carbon, resilient future.

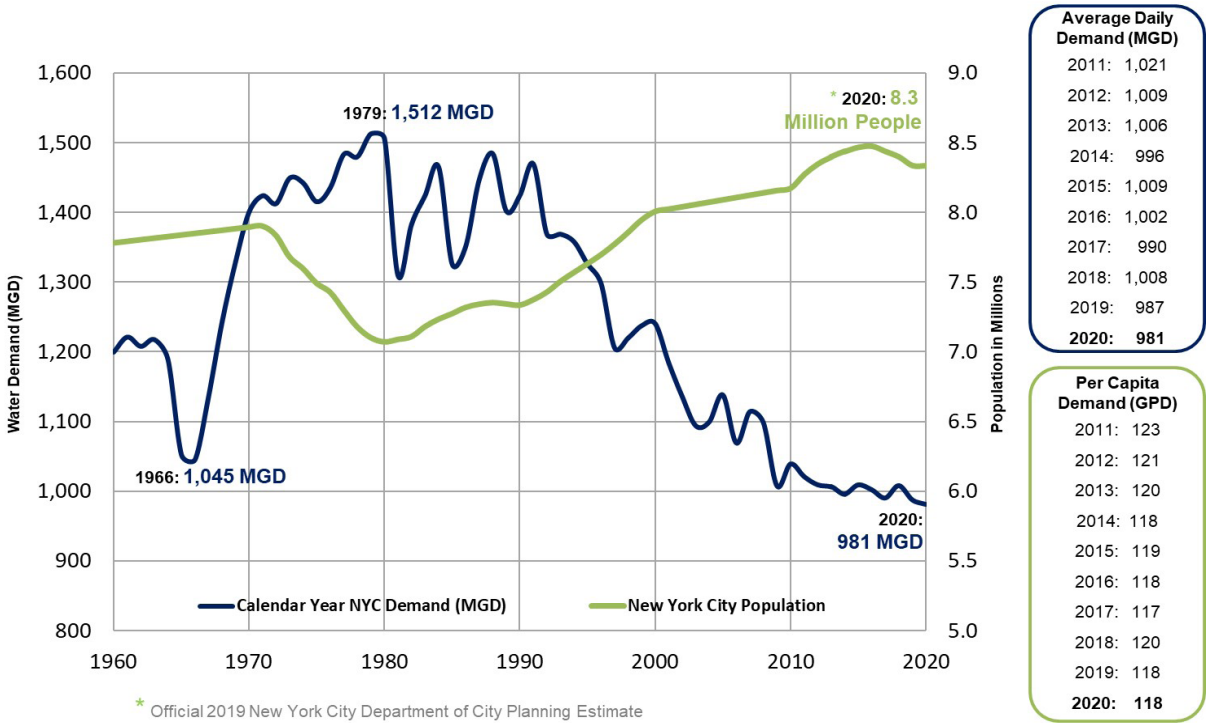
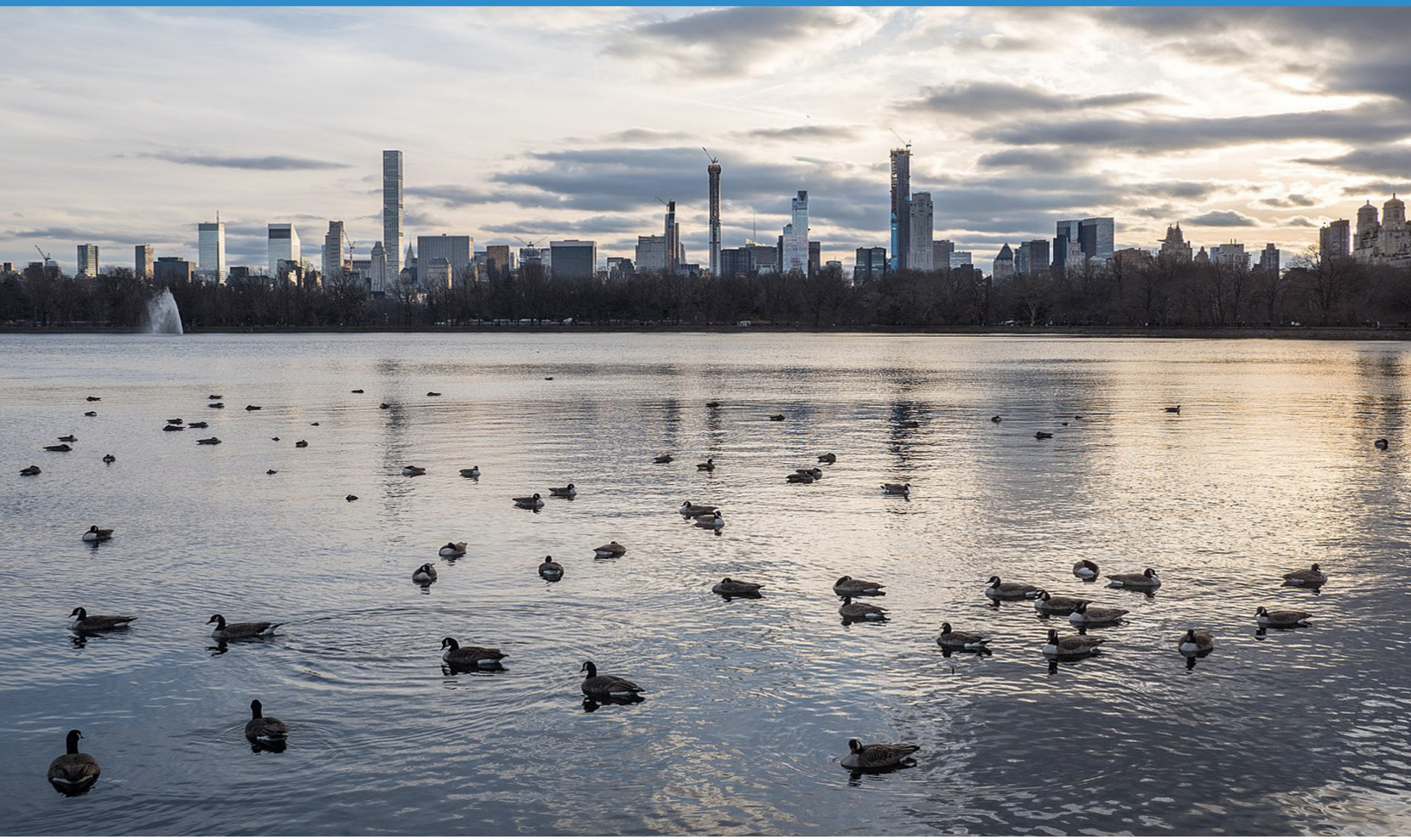


Figure 1: New York City Water Demand and Population Growth

Municipal Water Efficiency Program



New York City government workforce is comprised of over 350,000 employees working in over 50 city agencies, in dozens of City-owned facilities and buildings. Each employee uses water for daily operational needs and to carry out responsibilities that are critical to New York City. Through the Municipal Water Efficiency Program (MWEP), DEP works with fellow City agencies to retrofit and replace inefficient water fixtures and implement water reuse projects to ensure that water is used as efficiently as possible in City-owned facilities. Eight years into implementation, the largest share of savings from DEP's Water Demand Management Program is attributable to MWEP initiatives, due to the sheer size of the City's building stock.

Partner Agencies/Departments	Project
New York City Department of Education (DOE)	Bathroom Fixture Retrofits
New York City Health + Hositals Corporation (HHC)	Bathroom Fixture Retrofits
City University of New York (CUNY) - Queens College	Bathroom Fixture Retrofits
New York City Department of Parks and Recreation (DPR)	Water Recirulation/Reuse and Valve Replacement

Table 1: Ongoing MWEP Partnership Projects

Although the COVID-19 pandemic temporarily paused DEP's water conservation initiatives in 2020, DEP was able to complete municipal building retrofits in partnership with the NYC Department of Citywide Administrative Services, and water-saving equipment upgrades in DEP's WRRFs. DEP also made considerable progress with moving forward on four capital projects: water recirculation project in Central Park, valve replacement project in Prospect Park, fixture retrofits in New York City public school facilities, and fixture retrofits in a City College of New York facility. Through MWEP, DEP will continue to advance water efficiency, metering, education, reuse, and water loss control in City-owned facilities.

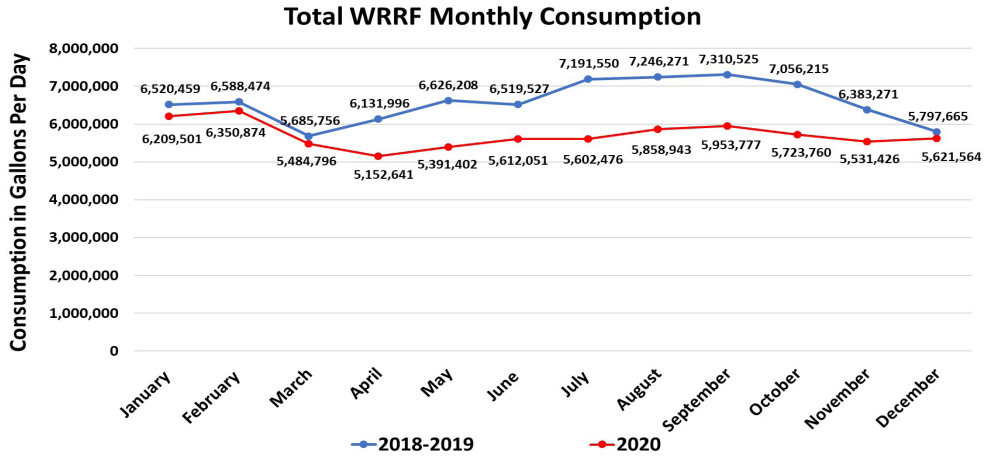
Wastewater Resource Recovery Facilities

Savings Achieved (May 2021): 2.73 MGD

Since 2013, DEP has been organizing Water Challenges to WRRFs to actively promote water conservation in DEP's own facilities and identify opportunities to improve operational efficiency. Overall, these water challenges have achieved a total savings of 2.73 MGD.

DEP's fifth Water Challenge was completed in January 2021 and for the first time, all 14 WRRFs were encouraged to reduce their daily water consumption by 10 percent over the course of a year. The fifth Water Challenge resulted in a total savings of approximately 0.9 MGD. Of the 14 WRRFs, eight were able to reduce water consumption by at least 10%. Red Hook achieved the most savings for WRRFs with dewatering facilities, with a total savings of 89,073 GPD, which is a 45 percent reduction from their baseline consumption. Coney Island achieved the most savings for WRRFs without dewatering facilities, with a total savings of 132,079 GPD, which is a 41 percent reduction from their baseline.

Water use was tracked during the Water Challenge with Automated Meter Reading transmitting devices that are installed on all potable water pipes entering the facilities. By tracking water usage, plant staff were able to monitor water savings associated with any interventions that they identified and implemented. These interventions ranged from introducing new standard operating procedures to purchasing and installing new, more efficient equipment. Some water conservation projects that were identified during the challenge include isolating and repairing leaks, minimizing use of potable water and extending effluent use, incorporating water reuse during certain wastewater treatment processes, retrofitting indoor plumbing with water efficient fixtures, and updating old or broken equipment. DEP will continue to coordinate with plant staff to explore future opportunities for water conservation projects that reduce potable water consumption and ensure long term savings. For more information on identified projects, see the case study on the following page.



2020 Percent decrease from 2017-2019 Baseline Average	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	5%	4%	4%	16%	19%	14%	22%	19%	19%	19%	13%	3%

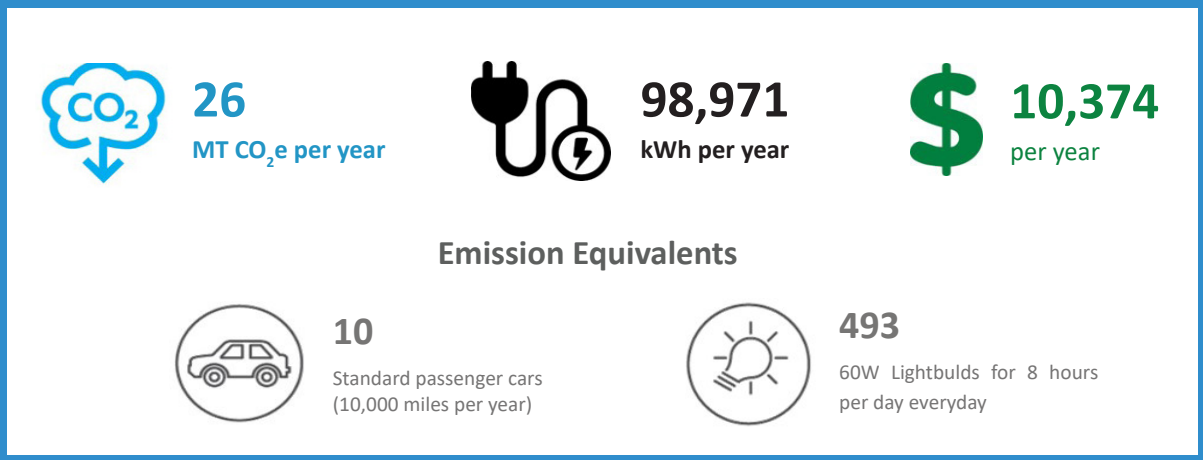
Figure 2: Total Monthly Wastewater Resource Recovery Facility Consumption

Case Study: Saving Water & Energy at Wastewater Resource Recovery Facilities

As part of the fifth Water Challenge to wastewater resource recovery facilities (WRRFs), DEP identified equipment repairs, retrofits, upgrades, and other projects that save water. For several projects, DEP's Water-Energy Nexus Tool was used to calculate the reduction in electricity use and carbon dioxide equivalent (CO2e) to apply for funding from the Department of Citywide Administrative Services (DCAS) Expenses for Conservation and Efficiency Leadership (ExCEL) Program, which supports City agencies to implement projects that reduce energy and greenhouse gas emissions. These savings come in the form of avoided emissions and reduced energy requirements from less pumping and treatment, which helps DEP reduce its overall carbon footprint.

Through this process, a project at Coney Island WRRF was identified and approved for funding. The project involves repairing broken piping and valves within the plant, boiler, and associated plant-wide loop, that are causing significant water leaks. This project is estimated to reduce water usage by 3.6 million gallons per year (MGY). In addition to significant water savings, this project is estimated to reduce Coney Island WRRF's annual greenhouse gas emissions by 40 metric tons CO2e, electricity use by 7,081 kilowatt hours per year, and natural gas usage by 18,765 therms per year. This will be the third water conservation project to be successfully funded with money specifically allocated for achieving energy and greenhouse gas reductions, further demonstrating the water-energy nexus.

The implementation of water conservation projects at WRRFs has proven to be an effective way to improve operational efficiency while also achieving additional sustainability goals. Working closely with WRRF staff has provided a better understanding of where improvements can be made in the wastewater treatment process and how those improvements are directly linked to energy and greenhouse gas reductions. In 2020 alone, this effort has led to an estimated reduction of carbon emissions by 26 metric tons CO2e and energy use by 98,971 kilowatt hours per year. This is equivalent to 10 standard passenger cars (10,000 miles per year) or 493 60-Watt lightbulbs (used for 8 hours per day, every day), and a total energy cost savings of approximately $10,374 per year.



Energy Savings from Water Conservation Projects at WRRFs

New York City Department of Education

Savings Achieved (May 2021): 3.31 MGD

Potential Savings by 2022: 4.71 MGD

Since 2013, DEP and Department of Education (DOE) have partnered to upgrade bathroom fixtures in DOE facilities. To date, 402 facilities have been retrofitted with over 34,600 new and efficient fixtures, for a savings of 3.31 MGD. In 2020, DEP and DOE anticipated mobilizing construction crews to continue retrofitting up to an additional 200 facilities, but progress was temporarily stalled due to the COVID-19 pandemic. DEP continued to coordinate and virtually meet with DOE's Division of School Facilities and the School Construction Authority throughout 2020. In 2021, the Memorandum of Understanding (MOU) was fully executed, and retrofits are underway.

New York City Health and Hospitals Corporation

Savings Achieved (May 2021): 0.07 MGD

Potential Savings by 2022: 1.22 MGD

The New York City Health and Hospitals Corporation (HHC) operates the City's public hospitals and clinics and is the largest municipal healthcare system in the United States. Critical healthcare services are provided to more than 1.3 million New Yorkers in HHC facilities. Considering the size and scale of HHC's facilities, coupled with the water-intensive nature of hospitals, DEP's ongoing partnership with HHC remains a promising opportunity to increase water efficiency citywide.

DEP received capital funding to complete retrofits at Jacobi Hospital, Woodhull Hospital, Elmhurst Hospital, Bellevue Hospital, and North Central Bronx Hospital. In March 2020, DEP and HHC executed a Memorandum of Understanding to implement water efficiency fixture upgrades in these hospitals. HHC's contractor began surveying these facilities in early 2020 to identify the precise count and type of fixtures that are eligible for replacement or upgrade.

The surveys were paused in Spring 2020 and the project overall remains on hold due to the COVID-19 pandemic. The first confirmed case of COVID-19 in New York City was reported on March 1, 2020, and since then, HHC has provided critical care to tens of thousands of New Yorkers. From March through May of 2020 alone, HHC admitted 10,437 patients with confirmed or suspected COVID-19. DEP and HHC will resume their partnership after the pandemic subsides and when HHC's resources allow. In the meantime, DEP extends its heartfelt gratitude to all HHC staff on the frontlines of this unprecedented pandemic.

New York City Department of Citywide Administrative Services

Savings Achieved (May 2021): 0.02 MGD

The New York City Department of Citywide Administrative Services (DCAS) manages, leases, and purchases property for the City; operates, manages, and repairs courthouses and other City-owned public buildings; administers an energy conservation program; purchases supplies, materials and equipment for use by City agencies; is responsible for citywide fleet management including operation and maintenance of a motor vehicle pool; and supports government recruitment.

In 2018, DEP and DCAS surveyed 10 buildings in DCAS's direct portfolio of public buildings throughout the city. In June 2020, DCAS completed this partnership project by implementing 268 restroom fixture replacements in four of these buildings: DCAS offices (2 Lafayette Street), City Planning Building (22 Reade Street), Queens Criminal Court (125-01 Queens Boulevard), and Manhattan Civil Courthouse (111 Centre Street). These replacements achieve an estimated water savings of 17,200 gallons per day, or approximately 6.3 million gallons per year.

Queens Criminal Court

City University of New York

Savings Achieved (May 2021): 0.04 MGD

Potential Savings by 2022: 0.07 MGD

The City University of New York (CUNY) is part of New York State's public university system and is comprised of 25 colleges across the five boroughs, making it the largest urban public university in the United States. In 2014, DEP completed 780 fixture upgrades at CUNY City College, for a demand savings of 0.04 MGD. In 2020, DEP and CUNY extended their partnership and executed an Interagency Agreement in 2021 to replace inefficient fixtures at Queens College. In total, DEP and CUNY anticipate replacing over 600 fixtures across four campus buildings at Queens College, for an anticipated savings of 0.03 MGD. DEP and CUNY anticipate beginning these upgrades in 2021.

New York City Department of Parks and Recreation

Savings Achieved (May 2020): 1.1 MGD

Potential Savings by 2022: 2.73 MGD

The New York City Department of Parks and Recreation (DPR) is the steward of more than 30,000 acres of land — 14 percent of New York City — including more than 5,000 individual properties. DEP has partnered with DPR since 2013 on water conservation projects in City parks, beginning with retrofitting 400 spray showers and nine recreation centers citywide. In 2021, DEP and DPR made considerable progress in moving forward with water conservation initiatives in Central Park and Prospect Park.

Central Park

In 2020, DEP continued coordinating with Central Park Conservancy (CPC) and DPR on the North End Recirculation Project. The project will save up to an estimated 0.83 MGD of potable water by recirculating stormwater between the park's northern waterbodies, including the Harlem Meer. In Fall 2020, a major milestone was achieved when project design commenced. DEP and CPC continue to meet and coordinate regularly to discuss design alternatives, operation and maintenance, and to quantify the multiple benefits of this integrated, One Water project. In addition to the potable water reduction, other benefits include a combined sewer overflow (CSO) reduction of up to 3 million gallons per year in the East River, and improved water quality in the park's northern waterbodies. In 2020, DEP also continued coordinating with DPR to execute a memorandum of understanding (MOU) to facilitate the funding transfer from DEP to DPR. DEP anticipates executing this MOU in 2021.

Harlem Meer in Central Park

Prospect Park

In 2020, DEP continued coordinating with Prospect Park Alliance (PPA) to replace an existing service line valve in Prospect Park to achieve an estimated demand savings of 0.8 MGD. The service line supplies potable water to Prospect Park Lake and during rain events, PPA staff discharge water from the lake into the combined sewer system to avoid flooding the park. Additionally, during summer when evaporation occurs, Prospect Park Lake is supplied with an estimated 1 MGD or more of potable water, to maintain health and aesthetics. In December 2020, DEP and DPR executed a MOU for this project and completed the funding transfer from DEP to DPR. In Spring 2021, PPA hired an engineering firm to design and construct this engineering project. DEP and PPA will continue to meet regularly during design and construction, with construction anticipated to begin as early as 2021. As an integrated, One Water project, this valve replacement is expected to reduce CSOs during rain events to Gravesend Bay and the Upper Bay by up to 12 million gallons per year.

Prospect Park Lake

Residential Water Efficiency Program

Residential water demand in New York City continually accounts for the highest water use by land use type. In Fiscal Year 2020, residential properties accounted for 84 percent of the City's total meter-billed water demand (see Figure 3). DEP's 1994 Toilet Rebate Program and 2014 Toilet Replacement Program were two key initiatives that targeted increased fixture efficiency in Residential buildings and were critical in reducing Residential demand from inefficient fixtures. More than 13,600 toilets were replaced through the Toilet Replacement Program, achieving a demand savings of 0.63 MGD. Although the Toilet Replacement Program concluded in 2019, DEP continues to offer Home Water Savings Kits. In total, DEP has achieved a demand savings of 1.03 MGD through these two initiatives.

Volumetrically, citywide water demand in 2020 was largely consistent with 2019: 981 MGD compared to 987 MGD, respectively; a 0.6 percent decrease in 2020 (see Introduction, Figure 1). Demand by customer or land use type, however, has shifted due to the COVID-19 pandemic: Residential demand has increased, and Non-Residential demand has decreased. Overall, meter-billed Residential demand from March 1-December 31, 2020 versus the same period in 2019 increased 1.9%. Residential demand in January and February was lower in 2020 than in 2019, but beginning in March, due to business and school closures during the pandemic, Residential demand in 2020 was consistently higher each month than in 2019 (see Figure 4). Conversely, meter-billed Non-Residential demand from March 1-December 31, 2020 versus the same period in 2019 decreased by 27 percent. This is consistent with COVID 19-related trends and policies: New Yorkers were spending more time in their homes for work, recreation, and school, thus driving up Residential demand. Residential demand may return to average levels as work, school, and travel policies shift to pre-COVID-19 conditions.

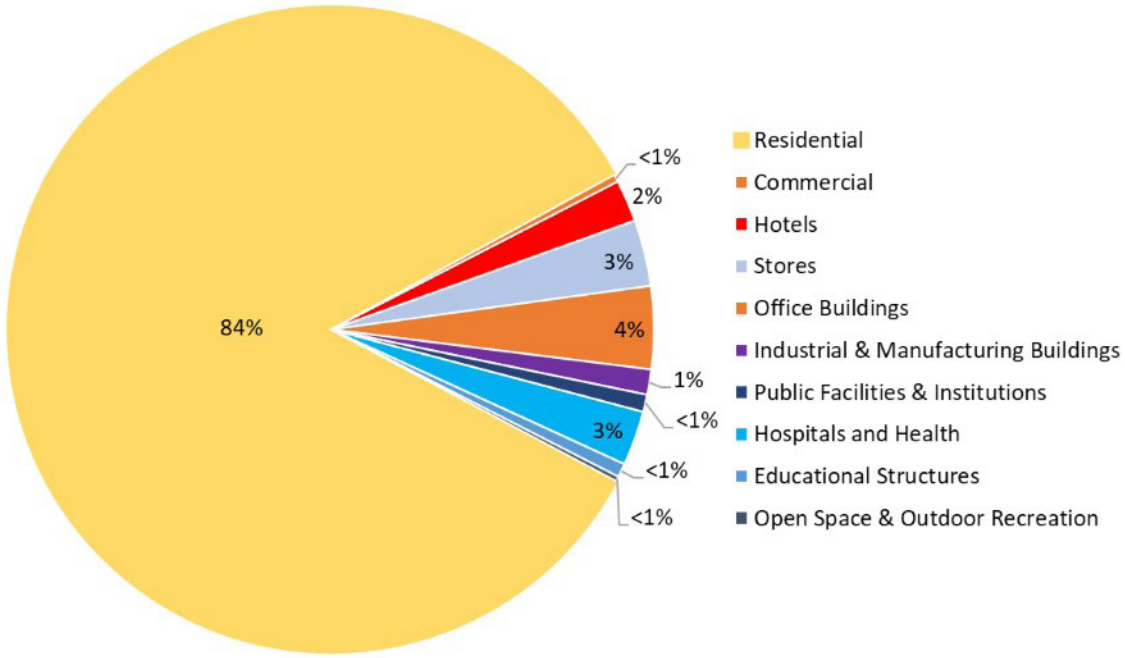


Figure 3: Fiscal Year 2020 Meter-billed Water Consumption by Land Use

Home Water Savings Kits

Savings Achieved (May 2020): 0.4 MGD

In addition to establishing the Toilet Replacement Program, DEP works with Honeywell to provide building owners with complimentary household water conservation surveys. The surveys assist building owners with identifying opportunities for water savings and detecting leaks. In 2020, Honeywell conducted surveys of 1,533 individual apartment units: 590 of those surveys were conducted in single-family apartment buildings, and 943 of those surveys were performed in 735 multi-family apartment buildings.

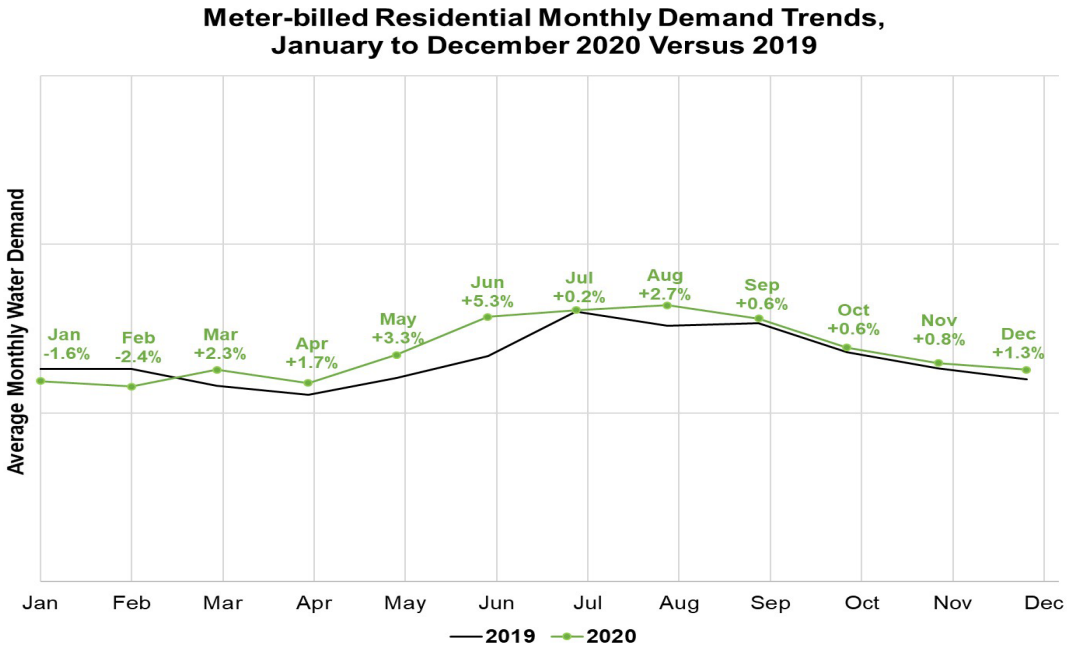


Figure 4: Meter-billed Residential Monthly Demand Trends, January to December 2020 Versus 2019

Non-Residential Water Efficiency Program

To increase water efficiency across all private sectors in New York City, DEP offers cost-sharing incentives and voluntary programs to property owners. DEP expanded its incentive program for water conservation to include non-residential private properties in 2016 by offering its cost-sharing On-site Water Reuse Grant Pilot Program, and then re-launching it as an expanded Water Conservation and Reuse Grant Pilot Program in July 2019. In addition, DEP has encouraged voluntary conservation by engaging non-residential property owners since 2013 through Water Challenges to specific sectors, including hotels, restaurants, hospitals, and, most recently, universities.

Despite disruptions caused by the COVID-19 pandemic, DEP was able to achieve notable milestones through its Non-Residential programming in 2020. DEP's Water Challenge to Universities, a voluntary program that engaged six universities in identifying and implementing water savings strategies, came to a close and achieved water savings of 0.12 MGD, exceeding programmatic goals. DEP is looking to build on previous successful Water Challenges to target new sectors, such as breweries. DEP's other Non-Residential program, the expanded Water Conservation and Reuse Grant Pilot Program, which was launched in July 2019, continued moving forward and DEP selected grant recipients for its first round of grant funding. While the primary goal of this program is to conserve potable water, on-site water reuse also offers opportunities for achieving co-benefits and is an important part of DEP's One Water approach towards managing water resources. In addition to conserving water, these

projects can also potentially reduce flows to the sewer system and wastewater facilities, which can contribute to reductions in combined sewer overflows (CSOs).

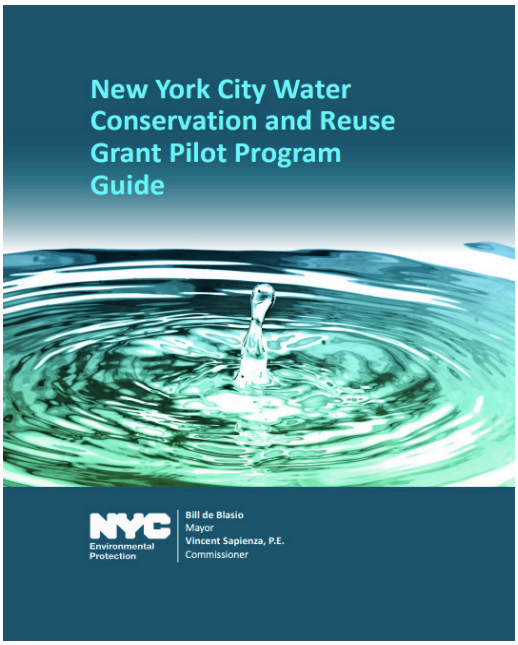
Water Conservation and Reuse Grant Pilot Program

Potential Savings by 2022: 0.2 MGD

In 2020, DEP received over 20 applications for water saving projects across New York City. After ranking these applications by their estimated water savings, cost effectiveness, feasibility, and additional metrics, DEP offered grant funding to the top five ranked projects. Of these projects, one applicant has accepted and is currently in the process of confirming their funding and legal agreements. The project includes a 400,000 gallon per day water reuse system that contributes not only water conservation benefits, but also CSO reductions.

After a successful first round, DEP launched a second round from July to October 2020 and subsequently shifted to a rolling basis application process. The Grant Program continues to incentivize commercial and residential water conservation projects including, but not limited to, retrofits and on-site water reuse systems that achieve a minimum water savings of 2,740 gallons per day, or one million gallons per year. The grant funding covers up to 100 percent of equipment costs for basic water efficiency retrofits, including water fixture replacements, or the fixed maximum unit price for WaterSense certified fixture replacements. For owner-identified water conservation projects, such as on-site water reuse, the Grant Program provides funding up to $10 per gallon per day of water saved.

Primed for new applications, DEP continues to coordinate administration of logistics for the selected grantee in moving their water conservation project forward. While the goal of the program is primarily to conserve potable water, the projects also offer the potential co-benefit of reducing flows to the sewer system and wastewater facilities. In reducing flow to sewers, on-site water reuse could also contribute to reducing CSOs. As an additional co-benefit, there is a potential reduction in greenhouse gas emissions from reduced flows to DEP's WRRFs.



Water Conservation and Reuse Grant Pilot Program Guide

Water Challenge to Universities

Savings Achieved (August 2020): 0.12 MGD

DEP completed its two-year Water Challenge to Universities in August 2020. Collectively, the six participants (Fordham University: Lincoln Center Campus, The New School, Long Island University: Brooklyn Campus, Pace University, St. John's University, and Weill Cornell Medicine) reduced their monthly average water consumption by 11 percent, or 3.4 million gallons – a total annual average savings of 41,400,000 gallons. Due to the COVID-19 pandemic and the campus closures that followed, reductions in water consumption were only considered and calculated toward the Challenge goal for the period of August 2018 to February 2020.

Water Challenge to Universities Virtual Meeting

Like other Challenges, the Water Challenge to Universities was a voluntary effort by participants to reduce their water consumption by at least 5 percent. The participating universities ranged in size, type, and resource availability. Through routine monitoring, knowledge sharing during quarterly workshops, and reflection through the annual reporting process, participants identified projects to implement on their campuses that resulted in considerable water savings. Examples of implemented projects include replacement of inefficient, older HVAC equipment, using water-intensive equipment only when most needed, and retrofitting older toilets. In addition to focusing on facility-level water savings, several of the participants developed water conservation campaigns to engage their students, faculty, and staff.

PACE UNIVERSITY

Weill Cornell Medicine

ST. JOHN'S UNIVERSITY

Water Challenge to Universities Gold Winners

Water Challenge to Breweries

Potential Savings by 2022: TBD

Over recent years, New York City has seen a sharp increase in its number of local craft breweries, with over 40 breweries open today. This not only provides New Yorkers with a number of options for where to grab a cold one (made with NYC's award-winning tap water), but also represents an opportunity to reduce citywide water demand. According to the Brewers Association, while craft breweries are becoming more water efficient, the average water use ratio for a brewery is approximately 294 gallons of water to 42 gallons of beer. Additionally, a significant amount of water used at breweries is discharged as effluent. Effluent from breweries can be a challenge for WRRFs due to a comparatively high nutrient loading from organics and solids associated with ingredients used during the brewing process.

DEP is exploring the potential for a Water Challenge to Breweries to help improve water efficiency and wastewater management, which presents environmental and economic opportunities to brewers. The Challenge would encourage participating breweries to voluntarily reduce their water usage and wastewater discharges by targeted goals. The Challenge would offer participating breweries the opportunity to be recognized for their water efficiency and wastewater management efforts as part of broader citywide sustainability goals. Participating breweries will also have access to a diverse forum of peers, industry experts, and sustainability organizations that will provide contacts, best practices, and technical assistance needed to achieve reductions in water use, wastewater discharges, and operational costs.

Water Distribution System Optimization

Each day, one billion gallons of water are delivered from DEP's 19 upstate reservoirs to over 830,000 service lines in residential and non-residential buildings, which provide this water for use by New York City's over 8 million residents. For operating and maintaining this vast infrastructure system, much of which is underground, DEP employs system-wide best practices. These practices include pressure management, system-wide leak detection and repair, meter replacement, Automated Meter Reading (AMR) software, and providing an online platform for customers to track and monitor water use and detect leaks in their buildings.

Leak Detection Program

Savings Achieved (May 2020): 1.89 MGD

DEP has a large service area with approximately 7,000 miles of pipes that distribute water to end users. As water travels through these underground pipes, undetected leaks can occur, therefore constant maintenance, leak detection, and metering optimization is key to efficient management of New York City's water supply. DEP's goal is to increase leak survey efforts by modernizing the leak detection program to detect, locate, and stop water leakage by leveraging best in class technology to pinpoint hard to find and unreported leaks. Additionally, DEP's goal is to increase the number of miles surveyed by increasing staffing to reinstitute multiple, proactive surveys of high-risk mains. In 2020, DEP surveyed 455 miles of water mains.

Hydrant Maintenance and Controlling Illegal Use

New York City has over 109,500 hydrants located throughout the five boroughs. These critical fire suppression assets can discharge up to 1,000 gallons per minute. When opened by New Yorkers in the summer to cool off without an approved spray cap, local water pressure can be negatively impacted. Therefore, DEP sponsors the Hydrant Education Action Team (HEAT) to educate New Yorkers about the risks of illegally opening hydrants.

DEP ensures proper maintenance by performing assessments, testing pressure, and repairing hydrants when necessary. In 2020, DEP repaired 7,841 hydrants, replaced 1,018, and provided other maintenance services to 20,431 additional hydrants.

Optimize Pressure Management

DEP continually works to improve maintenance of the pressure zones within the city's water distribution system. In 2020, the number of breaks per 100 miles was 5.3, slightly below the City's 10-year average of 6.8, and below the accepted industry average of 25 breaks per 100 miles annually. In 2020, DEP completed 5,489 preventive maintenance inspections/calibrations on pressure regulating valves. DEP also overhauled 48 of the 500 pressure regulating valves that are in use citywide.

Automatic Meter Reading Infrastructure

In 2009, DEP launched its AMR program and largely completed that effort in 2012. DEP has installed approximately 829,000 AMR transmitters, representing 99% of DEP's AMR installation target. All customers whose accounts have been upgraded for AMR can now access details of their water usage through DEP's website.

Commissioner Sapienza and Hydrant Education Action Team (HEAT) Members Educating the Public on the Dangers of Illegally Opening Fire Hydrants

Optimize Metering and Replace Large Water Meters

DEP's efforts to achieve universal metering of all DEP water and sewer accounts is motivated by the need to reduce non-revenue water and promote conservation among water users by providing accurate consumption information. The universal metering initiative is also critical to measuring the success of many other demand management strategies. Accurate consumption data enables DEP to determine whether target consumer groups have achieved projected consumption reductions or how demand management strategies may be adapted to improve their effectiveness. Due to the COVID-19 pandemic, meter replacement operations were paused for seven months. In the remaining active five months in 2020, DEP replaced 708 large meters (i.e., those over 1.5 inches in diameter).

Provide Customers with Easy and Timely Access to Water Usage Data

DEP's Bureau of Customer Services provides customers online access to their water consumption data, allowing customers to view their consumption and identify leaks and other inefficiencies. By becoming familiar with their consumption trends, customers can correct identified leaks in their own homes to save money and water.

For example, through My DEP, customers can view their bills, water usage, and payment history online. This service also allows customers to pay their bills online and sign up to automatic billing (eBills). Customers who sign up for My DEP also have the option to receive leak alerts, which are sent when consumption triples for five consecutive days. DEP continues to promote My DEP and leak detection alert enrollment as an ongoing initiative.

New York City Fire Hydrant

Water Supply Shortage Management

DEP continually examines water use restriction best practices to adapt to future water supply conditions. These future conditions include changing hydrologic conditions due to climate change, aging infrastructure, unplanned water supply shortages like drought, and temporary, non-emergency infrastructure repair, such as the approaching Delaware Aqueduct shutdown. New York City has encountered approximately nine drought periods of record, the most recent being 20 years ago in 2001. Although Water Supply Shortage Management does not provide permanent demand savings, this strategy plays a key role in temporarily reducing demand when needed most—when supply is limited.

Develop an Outreach Campaign and Communications Strategy

In March 2019, DEP began developing an outreach campaign for efforts both in the months leading up to the Delaware Aqueduct shutdown, and during the shutdown, to increase water conservation awareness and achieve non-emergency temporary demand savings ahead of the shutdown.

DEP's targeted demand reduction implementation plan, as part of the Outreach Campaign, identifies four key stakeholder groups to engage as part of a broad task force for implementation of short-term conservation strategies: internal DEP, interagency and upstate wholesale customers, large water users, and general public. The implementation plan also includes an

implementation approach (including best practices for engaging each stakeholder group), a targeted demand reduction schedule, and short-term conservation strategies that each stakeholder group can implement as a risk mitigation measure against demand fluctuations prior to the shutdown (e.g., demand increases more than anticipated), or for specific risk events during the shutdown (e.g., atypical demand spikes).

Prior to the COVID-19 pandemic, DEP was moving forward with the above implementation plan and took steps to convene the task force. DEP also analyzed additional targeted, short-term conservation opportunities, as mentioned above. The goal of this effort is to increase the likelihood of water supply readiness in a "belts-and-suspenders" approach to successful completion of the Roundout West Branch Tunnel Bypass Connection, as part of the Delaware Aqueduct shutdown and repair.

For example, for the Internal DEP stakeholder group, DEP's Operating Bureaus – Bureau of Water Supply, Bureau of Water and Sewer Operations, and Bureau of Wastewater Treatment – will have an important role in identifying short-term operational water reduction efforts, such as optimizing line flushing schedules before and during the shutdown and repair. These efforts were placed on temporary hold in 2020, due to the necessity to focus DEP's resources on critical needs during the pandemic. DEP anticipates revisiting the Outreach Campaign and task force activities in the second half of 2021.

Updated Rules and Plan to Allow for Planned Infrastructure Repairs

DEP is in the process of amending the "Drought Emergency Rules" (15 RCNY Chapter 21). The rulemaking process in New York City, called City Administrative Procedure Act (CAPA), began in July 2013 for this effort and in December 2016, the Mayor's Office of Operations and the City Law Department certified DEP's revisions to the "Drought Emergency Rules." The proposed revised title is "Water Shortage Emergency Rules," replacing the narrower focus of the previous title. In summary, the proposed revisions address water shortage emergencies due to circumstances not limited to natural drought conditions, including planned and unplanned infrastructure outages and repairs. The proposed revisions also add, remove, and change certain water use prohibitions during the different stages of a water shortage emergency, to better reflect DEP's understanding of city water use. Although the proposed action would not apply to routine residential water use such as drinking and bathing, or dishwashing, DEP expects that public awareness of the restrictions would lead to decreased residential water use during a water shortage. DEP expects to promulgate this rule before the Delaware Aqueduct shutdown.

Croton Spillway

Wholesale Customers Water Demand Management Program

Rye Lake Water Treatment Plant
Photo Credit: Westchester Joint Water Works

The Wholesale Customers Demand Management Program was launched by DEP in 2014 to extend demand reduction strategies to its wholesale customers (Utility Partners). The goal of this program is for Utility Partners to implement demand management projects to reduce demand by 5 percent from their 2013 baseline demand by October 2022. To achieve this, DEP partnered with some of its largest utility partners to develop custom Water Demand Management Plans (WDMP) tailored to each Utility Partner's water system. These Utility Partners include the Town of Greenburgh, the Village of Ossining, the Village of Scarsdale, the Village of Tarrytown, Westchester Joint Water Works (WJWW), the City of White Plains, and the City of Yonkers.

As part of the WDMP development, each Utility Partner selected specific demand management measures based on feasibility, cost-effectiveness, and combined ability to achieve the 5 percent reduction goal. Each WDMP includes a water system profile, a non-revenue water analysis, a summary of current demand management practices, an evaluation of potential demand management measures, and an implementation plan comprised of selected demand management measures for implementation. To ensure the implementation of each WDMP, DEP and Utility partners intended to enter into intergovernmental funding agreements to allow DEP to provide funding for selected measures.

Due to unforeseen circumstances brought on by the COVID-19 pandemic, anticipated funding for this program was reallocated to help offset the fiscal impacts brought on by the pandemic. As such, DEP and its Utility Partners have agreed to pause current plans to implement projects under this program until funding becomes available. Utility Partners were encouraged to continue utilizing tools that were introduced and discussed during prior collaboration, including continuing to improve their efforts to address non-revenue water.

DEP's robust outreach and engagement, coupled with the determination and initiative of the Utility Partners, has resulted in considerable demand savings, despite the pandemic-related impacts (Table 5). For example, several Utility Partners were able to complete AWWA water loss audits, perform system wide leak detection surveys, and enhance their leak detection strategies, which has resulted in water savings from needed leak repairs. Others were able to move forward with programs like a Toilet Replacement Voucher Program, the installation of system-wide automated meter infrastructure, the development of 30-year water main replacement program, and the development of a customer portal that allows their customers to monitor daily water usage. In total, the two-year sustained water demand savings achieved by these seven Utility Partners is 5.21 MGD, a 9 percent decrease from their 2013 baseline (Figure 5). The Village of Ossining had previously achieved a demand savings of 0.1 MGD, resulting in the total demand reduction of 5.31 MGD, as shown in Table 5. DEP would like to thank and recognize its participating Utility Partners for implementing conservation projects and water loss control strategies to achieve these savings.

Utility Partner	2013 Baseline Demand (MGD)	Demand Reduction Goal (MGD)	Total Demand Reduction, 2019-2020 (MGD)
Greenburgh	6.34	2.84	5.31
Ossining	2.52		
Scarsdale	3.24		
Tarrytown	1.72		
WJWW	8.99		
White Plains	7.93		
Yonkers	26.15		
Total	56.89	2.84	5.31

Table 5: Wholesale Demand Management Program Achievements

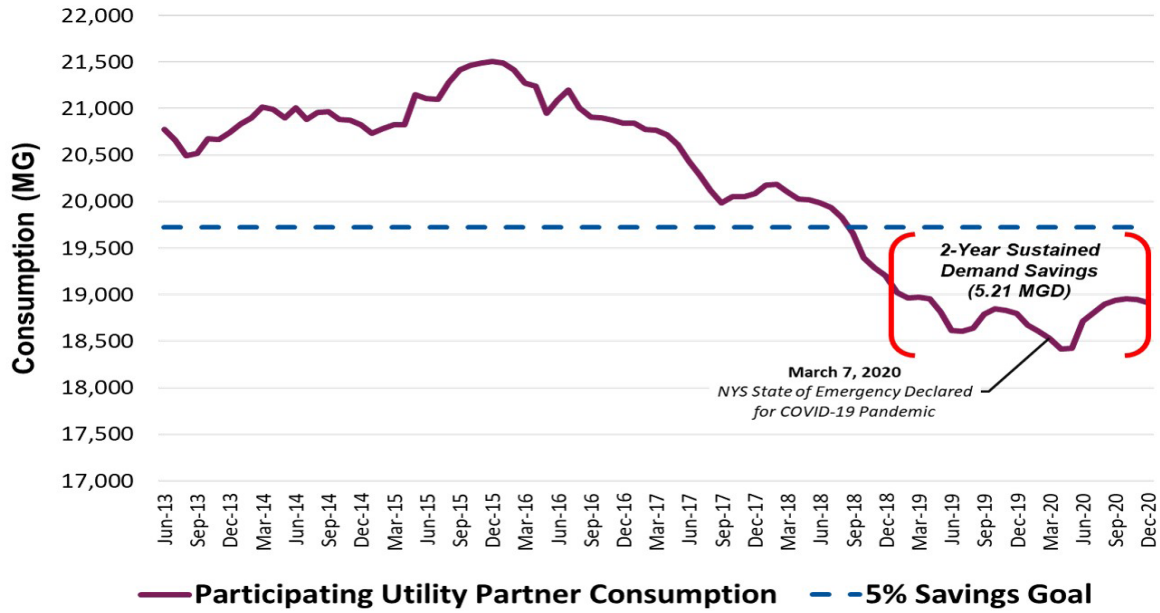


Figure 5: Wholesale Demand Management Program Consumption - DEP calculated the 2-year average demand (January 2019-December 2020) for each Utility Partner and subtracted that from the 5% savings goal, to arrive at the total savings achieved.

Appendix A

In response to the COVID-19 pandemic, New York State Governor Andrew Cuomo declared a State of Emergency in New York on March 7, 2020. Likewise, on March 13, 2020, the Federal government declared a nationwide emergency. COVID-19 has disrupted travel, commerce, and financial markets globally and in New York City. While the long-term impact on New York City cannot be predicted, the initial economic and financial impacts have been substantial.

In addition to economic and financial impacts, the COVID-19 pandemic has impacted water demand trends nationwide. On April 14, 2020, the American Water Works Association (AWWA) and Association of Metropolitan Water Agencies published a report on the impacts of COVID-19 on water utilities, "The Financial Impact of the COVID-19 Crisis on U.S. Drinking Water Utilities." The implications cited in this report include potential increase in customer delinquencies, reduction in demand and corresponding reductions in revenue, delayed and reduced capital expenditures, increases in personnel expenses, and deferral of water rate increases.

In New York City, water demand declined about 5 percent (nearly 50 million gallons per day) from mid-March 2020 through April 30, 2020, following City, State, and Federal emergency declarations due to COVID-19. Citywide demand began rebounding in June, consistent with the phased reopening of New York State. Overall, volumetrically, citywide water demand in New York City in 2020 was consistent with 2019. Demand from March 1 through December 31, 2020 was about 0.3 percent less (about 3 MGD less) versus the same period in 2019 (see Figure 6).

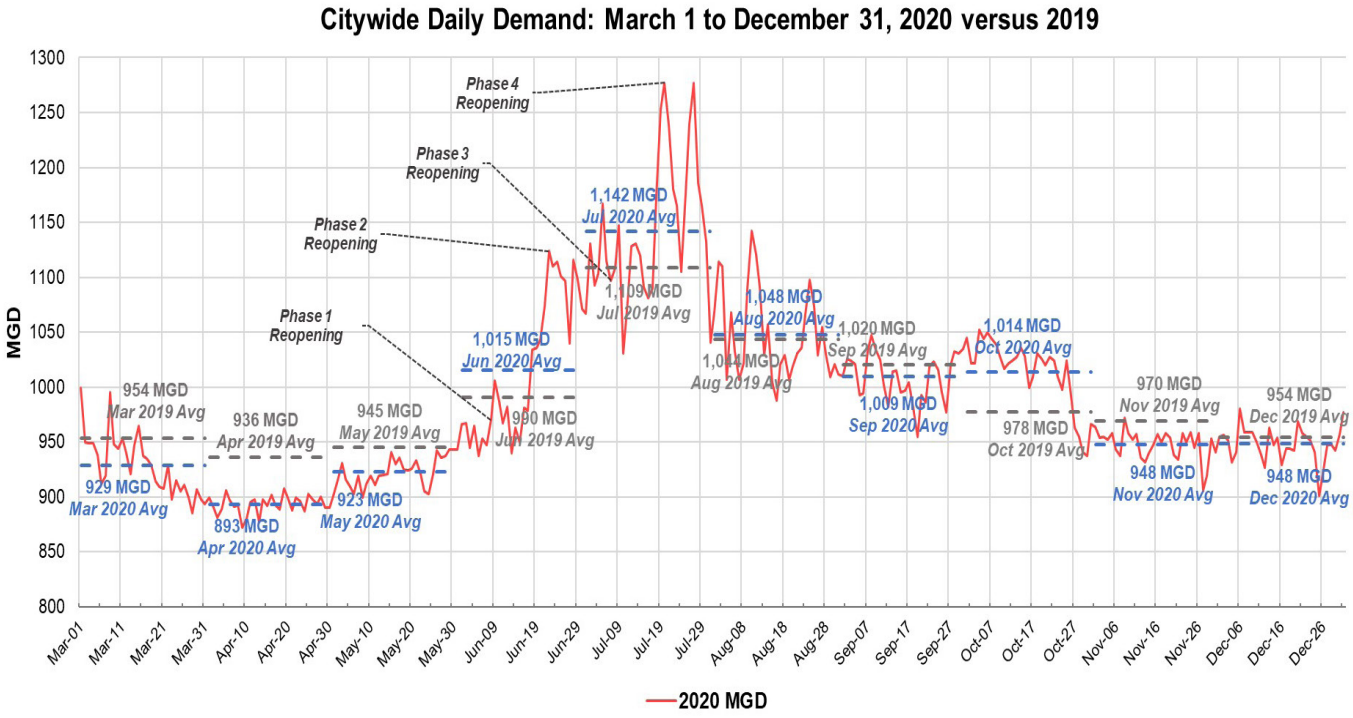


Figure 6: Citywide Daily Demand: March 1 to December 31, 2020 Versus 2019

The AWWA report further states that on average, utilities across the country are experiencing decreases in Non-Residential demand and increases in Residential demand. Indeed, demand by customer type has shifted in New York City due to COVID-19: Residential demand has increased, and Non-Residential demand has decreased. These trends are consistent with COVID 19-related policies and restrictions. New Yorkers are spending more time in their homes for work, recreation, and school, thus driving up Residential demand. Conversely, New Yorkers are spending less time, or in some cases have paused altogether, shopping, attending movies, concerts, and sporting events, and eating and drinking in restaurants and bars. DEP began closely analyzing water demand trends in March 2020. As shown in Tables 6 and 7, these behavior shifts are apparent in Meter-billed Residential and Non-Residential demand trends.

Mar	Apr	May	Jun	July	Aug	Sept	Oct	Nov	Dec	10-Month Averge
2.3 %	1.7%	3.3%	5.3%	0.2%	3.0%	0.6%	0.6%	0.8%	1.3%	+1.9%

Table 6: Percent Change in Meter-billed Residential Demand, 2019 versus 2020.

Mar	Apr	May	Jun	July	Aug	Sept	Oct	Nov	Dec	10-Month Averge
-19.8%	-42.7%	-35.0%	-25.0%	-26.9%	-21.8%	-25.5%	-26.1%	-23.5%	-24.5%	-27.0%

Table 7: Percent Change in Meter-billed Non-Residential Demand, 2019 versus 2020.

Although Meter-billed Non-Residential demand decreased a sizable 27 percent, it was largely offset by the increase in Meter-billed Residential demand, leading to small decreases in citywide Meter-billed demand overall (see Table 8). This is because there are more Meter-billed Residential accounts than Non-Residential, so the magnitude of the Residential increase is more impactful.

Mar	Apr	May	Jun	July	Aug	Sept	Oct	Nov	Dec	10-Month Averge
-1.3%	-6.1%	-3.7%	-0.5%	-5.4%	-1.9%	-4.3%	-4.1%	-3.2%	-2.8%	-3.3%

Table 8: Percent Change in Meter-billed Demand (Residential and Non-Residential), 2019 versus 2020.

Residential and Non-Residential demand may return to average levels when work, school, and travel policies shift to pre-COVID-19 conditions. Additionally, neighborhood-specific demand trends may continue to shift, based on land use, socioeconomic, and public health characteristics. DEP will continue to closely analyze these trends as the pandemic continues, and after the pandemic ends, to pinpoint any lasting effects the pandemic may have on citywide water demand.

Appendix B

New York City per capita water consumption has remained steady since the first Water Demand Management Plan was released in 2013, from 119 gallons per day per person, to 118 gallons in 2020. As DEP continues to expand AMR and volumetric meter-based billing, overall water demand is expected to remain stable or decrease. This trend could be affected in the future by factors including, but not limited to annual temperature fluctuations, weather, climate, potential drought, and population fluctuations.

To explore these trends, DEP conducts water demand data analyses for our system each year. These analyses help the agency with water supply and wastewater infrastructure planning; revenue analysis; affordability studies; new growth and rezoning assessments; and analyzing and understanding the effects of water demand on agency operations. Since 2013, DEP has used American Water Works Association (AWWA) M36 water audit software to assess system water balance. The table below illustrates the results of DEP's Fiscal Year 2020 audit. Since using the software, DEP has seen a decrease in non-revenue water from 17 percent in 2013 to 16 percent in 2019. Non-revenue water has decreased since 2013 and remains steady.

AWWA Free Water Audit Software:
System Attributes and Performance Indicators

WAS v5.0
American Water Works Association.
Copyright © 2014, All Rights Reserved.

Water Audit Report for: NYC Department of Environmental Protection
Reporting Year: 2020 7/2019 - 6/2020

*** YOUR WATER AUDIT DATA VALIDITY SCORE IS: 78 out of 100 ***

System Attributes:

	Apparent Losses:	16,422.112	MG/Yr
+	Real Losses:	35,621.263	MG/Yr
=	**Water Losses:**	**52,043.375**	MG/Yr
?	Unavoidable Annual Real Losses (UARL):	4,094.75	MG/Yr
	Annual cost of Apparent Losses:	$226,776,254	
	Annual cost of Real Losses:	$18,879,269	Valued at **Variable Production Cost**

Return to Reporting Worksheet to change this assumpiton

Performance Indicators:

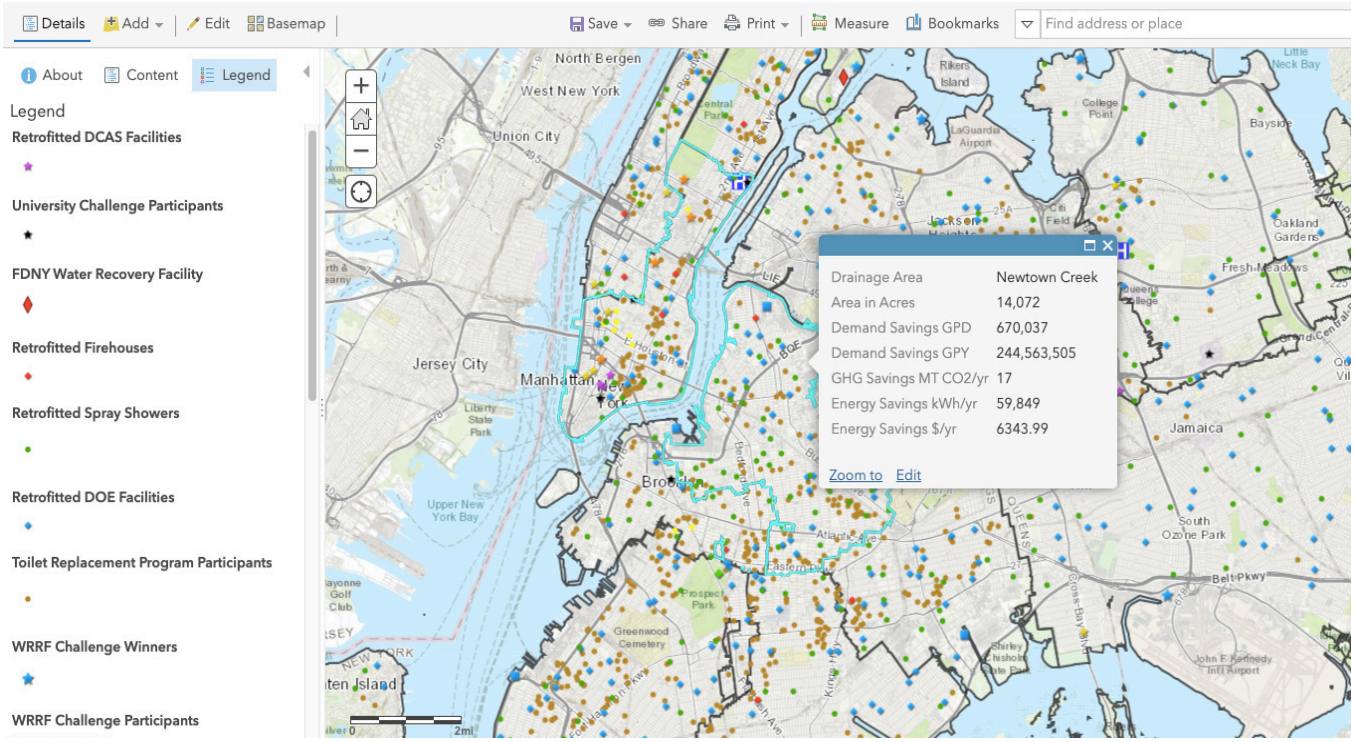
Financial:	Non-revenue water as percent by volume of Water Supplied:	16.9%	
	Non-revenue water as percent by cost of operating system:	38.2%	Real Losses valued at Variable Production Cost
Operational Efficiency:	Apparent Losses per service connection per day:	53.83	gallons/connection/day
	Real Losses per service connection per day:	116.77	gallons/connection/day
	Real Losses per length of main per day*:	N/A	
	Real Losses per service connection per day per psi pressure:	1.95	gallons/connection/day/psi
	From Above, Real Losses = Current Annual Real Losses (CARL):	35,621.26	million gallons/year
?	Infrastructure Leakage Index (ILI) [CARL/UARL]:	8.70	

* This performance indicator applies for systems with a low service connection density of less than 32 service connections/mile of pipeline

AWWA Water Audit Results for Fiscal Year 2020

Appendix C

DEP released a public map of its water conservation projects across New York City in 2018 that is updated upon the completion of new projects. All projects and their respective savings have been mapped and are available to view through DEP's water conservation website. In addition, DEP has used the Water-Energy Nexus Tool to estimate the energy savings and benefits of water conservation, including the reduction in electricity and greenhouse gases that would have been required to process and treat the water. A screenshot of this interactive map showing conservation projects and associated energy and greenhouse benefits is shown below.



Demand Management Interactive Map